CLAIMS

1. A method for locating an impact on a surface (9, 15, 17, 22) forming part of an object (5, 3, 16, 18) forming an acoustic interface, provided with at least one acoustic sensor (6), a method in which at least one signal is sensed from acoustic waves generated in the object forming an acoustic interface (5, 3, 16, 18) by said impact and the impact is located by processing of said sensed signal,
characterized in that it comprises a recognition step during which the sensed signal is compared with at least one predetermined signal corresponding to the signal that is sensed when an impact is generated on at least one active zone (10) forming part of the surface of the object forming an acoustic interface (5, 3, 16, 18) and the impact is associated with said active zone (10) if the sensed signal is sufficiently similar to said predetermined signal.

2. The method as claimed in claim 1, in which the surface of the object forming an acoustic interface comprises several active zones (10) and, during the recognition step, the sensed signal is compared with several predetermined signals each corresponding to the signal sensed when an impact is generated on one of said active zones (10).

3. The method as claimed in claim 1 or in claim 2, in which several acoustic sensors (6) are used and, during the recognition step, one signal is sensed for each acoustic sensor and the signals sensed by the different acoustic sensors are compared with the predetermined signals independently of one another.

4. The method as claimed in any one of the preceding claims, in which several acoustic sensors (6) are used and, during the recognition step, a signal is sensed

for each acoustic sensor and the signals sensed by the various acoustic sensors are compared with the predetermined signals in a different way from one another.

5. The method as claimed in any one of the preceding claims, in which several acoustic sensors (6) are used measuring several different magnitudes.

6. The method as claimed in any one of the preceding claims, in which at most two acoustic sensors are used.

7. The method as claimed in claim 1 or in claim 2, in which a single acoustic sensor (6) is used.

8. The method as claimed in any one of the preceding claims, comprising an initial learning step during which each predetermined signal is determined experimentally by generating at least one impact on each active zone (10).

9. The method as claimed in any one of claims 1 to 8, in which each predetermined signal is a theoretical signal.

10. The method as claimed in any one of the preceding claims, in which, during the recognition step, the sensed signal is compared with said at least one predetermined signal by intercorrelation.

11. The method as claimed in any one of claims 1 to 9, in which, during the recognition step, the sensed signal is compared with said at least one predetermined signal by a process of recognition chosen from voice recognition, signal recognition, shape recognition and recognition by neural network.

12. The method as claimed in any one of the preceding claims, in which, during the recognition step, the

sensed signal is associated either with a single active zone, or with no active zone.

13. The method as claimed in claim 12, in which each active zone is associated with a predetermined information element and, when the impact is associated with an active zone, an electronic device is made to use the predetermined information element corresponding to that active zone.

14. The method as claimed in either one of claims 12 and 13, in which the surface (9, 15, 17, 22) of the object forming an acoustic interface comprises a number n of active zones (10), n being at least equal to 2, and the recognition step comprises the following sub-steps:

- an intercorrelation is made between the sensed signal and said predetermined signals Ri(t), i being a natural integer lying between 1 and n which designates an active zone, and intercorrelation functions Ci(t) are thus obtained,
- a potentially activated active zone j is determined which corresponds to the result of intercorrelation Cj(t) having a maximum amplitude greater than those of the other results Ci(t),
- the distribution D(i) of the amplitude maxima of the intercorrelation results is also determined:

  D(i) = Max ((Ci(t)),
- the distribution D'(i) of the amplitude maxima of the intercorrelation results C'i(t) between Rj(t) and the various predetermined signals Ri(t) is also determined:

  D'(i)= Max((C'i(t)),
- a determination is made as to whether the impact was generated on the active zone j as a function of a level of correlation between the distributions D(i) and D'(i).

15. The method as claimed in either one of claims 12

and 13, in which, during the recognition step, the sensed signal is processed in order to extract therefrom the data representative of certain characteristics of the sensed signal and the data thus extracted is compared with reference data extracted from the signal that is sensed when an impact is generated on each active zone.

16. The method as claimed in claim 15, in which, during the recognition step, a code is determined from said data extracted from the sensed signal and this code is compared with a table which gives a correspondence between at least certain codes and each active zone.

17. The method as claimed in any one of claims 1 to 14, in which the object forming an acoustic interface (5, 3, 16, 18) comprises at least two active zones (10) and, during the recognition step, the resemblance values representative of the resemblance between the sensed signal and the predetermined signals are determined, the impact (I) is associated with several adjacent active zones (R1-R4) corresponding to a maximum resemblance, called reference active zones, then, the position of the impact (I) on the surface is determined as a function of the resemblance values attributed to the reference active zones (R1-R4).

18. The method as claimed in claim 17, in which the position of the impact (I) on the surface is determined such that the resemblance values attributed to the reference active zones (R1-R4) correspond as much as possible to the theoretical resemblance values computed for said reference active zones for an impact generated in said position on the surface.

19. The method as claimed in claim 18, in which the position of the impact (I) on the surface is determined such that the resemblance values attributed to the

reference active zones (R1-R4) correspond as well as possible to theoretical resemblance values computed for said reference active zones for an impact generated in said position on the surface.

20. The method as claimed in claim 19, in which the theoretical resemblance values are functions of the position of the impact on the surface, determined in advance for each possible set of reference active zones (R1-R4).

21. The method as claimed in claim 8, in which the active zone is identified by comparison between the phase of the predetermined signals Ri(t) and of the sensed signal.

22. The method as claimed in claim 21, in which:

- a computation is made of the Fourier transform $R_i(\omega) = |Ri(\omega)|.e^{j\ \phi i(\omega)}$ of each acoustic signal $R_i(t)$ generated by an impact on the active zone i, where i is an index lying between 1 and n, and from this Fourier transform only the phase component $e^{j\ \phi i(\omega)}$ is retained, only in the frequency bands ω in which the amplitude $|Ri(\omega)|$ is greater than a predetermined threshold,
- then the same process is applied to each sensed acoustic signal S(t) during the normal operation of the device.

23. The method as claimed in claim 22, in which the predetermined threshold is equal to the maximum of MAX/D and $|B(\omega)|$, where:

- MAX is chosen from the maximal value of the modules $|R_i(\omega)|$, the maximal value of the modules $|R_i(\omega)|$ each normalized in energy, and the maximal value of the envelope of the average of the modules $|R_i(\omega)|$ each normalized in energy,
- D is a constant,
- $|B(\omega)|$ is the average of several noise spectra in the object forming an acoustic interface, acquired at

different times.

24. The method as claimed in either one of claims 22 or 23 in which, during the normal operation of the device:

- a product $P_i(\omega)$ is computed equal to $S'(\omega)$ multiplied by the conjugate of $R_i'(\omega)$ for references $i = 1 \ldots n$,
- then the products $P_i(\omega)$ are normalized,
- then the inverse Fourier transform of all the products $P_i(\omega)$ is carried out and temporal functions $X_i(t)$ are obtained,
- and the signal $S(t)$ is attributed to an active zone (10) as a function of said temporal functions $X_i(t)$.

25. The method as claimed in claim 24, in which the signal $S(t)$ is attributed to an active zone (10) as a function of the maximal values of said temporal functions $X_i(t)$.

26. A device especially adapted to implement a method according to any one of the preceding claims, for locating an impact on a surface (9, 15, 17, 22) forming part of an object (5, 3, 16, 18) forming an acoustic interface, provided with at least one acoustic sensor (6), this device comprising means for sensing at least one signal from acoustic waves generated in the object forming an acoustic interface (5, 3, 16, 18) by said impact, and means for locating the impact by processing said sensed signal,
characterized in that it comprises recognition means suitable for comparing the sensed signal with at least one predetermined signal corresponding to the signal that is sensed when an impact is generated on at least one active zone (10) forming part of the surface of the object (5, 3, 16, 18), and means for associating the impact with said active zone (10) if the sensed signal is sufficiently similar to said predetermined signal.